Restoring a Sense of Hope: Involving High School Students in Conservation

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Increasing challenges of habitat loss, climate change, and the disconnect between the public and these issues provides environmental educators the opportunity to offer science-driven, solution-oriented activities. Point Blue Conservation Science (Point Blue) has made great strides towards addressing these issues through our community-based restoration program, Students and Teachers Restoring A Watershed (STRAW)**.** This year we added a component to address these issues with high school students, an age group underserved by environmental programs. Focusing on climate change, ecological restoration, and the scientific method, we built a new science curriculum around one of STRAW's sites, the Hamilton Wetland Restoration Project in Novato, California**.** We engaged 150 high school students and 30 4th grade students. High school students worked with peers, professionals and elementary students in the field to plant native vegetation in a designated upland transition zone. In class Point Blue restoration specialists, biologists, and educators delivered lessons on wetlands, soil, climate change, ornithology and history of the Hamilton site. Students learned field skills to collect baseline bird and soil data to monitor ecosystem response to the restoration. Students followed Point Blue's standardized area search protocol during the waterbird surveys. Students sampled soil salinity and texture along designated transects. Next year students will collect data using the same methods, post levee breach. We assessed student progress and our ability to meet our objectives this first year by administering a pre and post-program assessment to all 150 high school students and leading a post-program pizza lunch discussion with a cross-section of students. Our goal by the end of 2014 is to develop a successful model to involve high school students in the solution to climate change and other environmental problems through habitat restoration and scientific monitoring.

Keywords: Restoration, Bird Monitoring, Native Vegetation Planting, Student Education, Citizen Science

Poster Topic: Public Education & Outreach

Digging Into Restoration Technology: Implementing Next Generation Science Standards in Student Wetland Restoration Programs

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Recognizing a need to incorporate higher level science curriculum into our Education Program offerings, Save The Bay designed Digging Into Restoration Technology (D.I.R.T.) to engage students in hands-on data collection of soil characteristics along an elevation gradient. Now entering its third year, D.I.R.T. has reached six Bay Area schools and over four hundred students. This program incorporates service learning, biology/chemistry principles, and technology utilization into a multi-day field experience conducted at active restoration sites on the shores of San Francisco Bay. Using SPARK data collectors and Hanna salinity meters, students sample soil pH, salinity, soil moisture and GPS coordinates along transects in both restored and unrestored sites. Back in the classroom, students analyze data electronically and upload graphical results to Save The Bay's web-based classroom extension, the Virtual Marsh: www.virtualmarsh.org.

Upon publication of the Next Generation Science Standards, we adapted the D.I.R.T. curriculum to align more closely with the core ideas and practices of these standards. Major modifications include the addition of Simpson's Biodiversity Index sampling, as well as a more deliberate focus on drawing connections between soil characteristics and plant life to inform student recommendations for future restoration plans.

This poster examines the challenges and successes encountered throughout the three year evolution of the D.I.R.T program, focusing specifically on the use of the Next Generation Science Standards to guide curriculum refinement.

Keywords: Community Based Restoration, Outdoor Education, Next Generation Science Standards

Poster Topic: Public Education & Outreach

Community Outreach, Education, and Mobilization of Volunteers for Native Oyster Reef Restoration

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The Watershed Project's Living Shoreline Program connects the community with a habitat that's often unexplored, the intertidal and subtidal ecosystems of San Francisco Bay.

The program's largest restoration project to date, a native oyster reef at Point Pinole Regional Park, provided the community with an opportunity to contribute their time, energy, and enthusiasm to improving the future health of the Bay.

Volunteers, each with their own particular interests in the project, helped to construct 100 oyster reef balls. This process involved the mixing of oyster shell and sand that had been dredged from the Bay with cement to create BayCrete. The mixture was then poured into molds to create the reef balls.

The Watershed Project begins each workday with volunteers sharing the following environmental story: the past, present, and future of Olympia oysters in San Francisco Bay. Volunteers then understand the context for their service and how each person is enhancing the Bay for years to come.

The Living Shoreline Program used various methods for volunteer recruitment, including our monthly E-newsletter, our in-house email list, personalized email lists, flyering at local environmental events, and community presentations. Our public outreach resulted in engaging 26 community volunteers. Out of those 26 volunteers, 9 people came back to volunteer an additional 22 times. Our volunteers contributed a total of 144 hours.

It speaks to the success of the program that volunteers repeatedly come back to perform work that involves being outdoors, getting dirty, and heavy lifting. We make every effort to connect and build relationships with our volunteers. We understand that providing a positive experience, combined with doing something worthwhile for the environment helps create environmental stewards.

(When the project is completed in August, I anticipate our recruitment numbers to increase to approximately 50 volunteers and 251 hours)

Keywords: Outreach, Native Oysters, Reef Balls, Restoration, Public Education, Point Pinole

Poster Topic: Public Education & Outreach

Clean Creeks, Healthy Communities: A Trash Reduction Pilot Program

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Coyote Creek, in San José California, is a ribbon of natural open space running through the heart of the heavily urbanized Santa Clara Valley. In central San José the creek is heavily impacted by trash pollution from litter, illegal dumping, and homeless encampments. The trash and poor condition of the riparian corridor harms water quality, dissuaded residents from use of the area, and impacts the surrounding environs.

In 2011 the City of San José received a grant from the U.S. EPA Water Quality Improvement Fund for a pilot project, Clean Creeks, Healthy Communities, to partner with organizations and agencies beyond the environmental field to collaboratively address the different causes of the trash pollution and reconnect the community to the creek. This project is based on the idea that detrimental behaviors occurring in the creek corridor are synchronistic and contribute to both degradation of water quality and blight in the area. The intent of the project is to reach a tipping point in the condition of the creek whereby community members gain appreciation of the creek as a community asset and are able to sustainably deter trash-generating behaviors through ongoing activities.

This poster will examine the strategy behind the Clean Creeks, Healthy Communities project and discuss the accomplishments and challenges the project has encountered at the mid-point of the project term.

Keywords: Trash, Illegal Dumping, Homeless Encampments, Volunteers, Outreach, Cleanup, Stewardship

Poster Topic: Public Education & Outreach

Tide Gate Closures Affect Dissolved Oxygen in Lake Merritt

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Tidal flushing in Lake Merritt, a tidal lagoon, is managed by the Alameda County Flood Control District at the Lake Merritt Flood Control Facility. The Facility provides a tidal barrier to flow between the Lake and the Oakland Harbor. Tide gates are closed at low tide when a 50% or greater chance of rain is forecast to prevent flooding as high tides meet fresh water inflows from storm run-off. The gates may remain closed for several days. Recently, the gates have been closed during construction of improvements to the Lake Merritt Channel funded by Measure DD.

The Lake Merritt Institute's "Dissolved Oxygen White Paper "(2002) called attention to the negative impact of tide gate closure on dissolved oxygen in the lake. It made recommendations for operating the gates to reduce impact on aquatic wildlife. Efforts to monitor the dissolved oxygen levels in the lake have consisted of brief contracted monitoring by the City of Oakland and the weekly volunteer monitoring by Oakland High School's Environmental Science Academy (ESA) students during the academic year.

To explore the effect of tide gate closure on dissolved oxygen, we 1) examined tide charts from the Lake Merritt Flood Control Facility from June-December 2012 and 2) analyzed ESA's 15-year data set to see when and where dissolved oxygen levels dropped below the standard of 5 ppm.

Our data indicate that closing the gates lowers the dissolved oxygen significantly, especially at the bottom of the water column. Organisms that cannot move may experience long periods of hypoxia. It suggests that we will not see benefits of widening the Lake Merritt Channel until closures are reduced. A more precise understanding of freshwater input from the watershed after rains is needed to respond adaptively to increased precipitation with climate change.

Keywords: Dissolved Oxygen, Monitoring, Tide Gate, Tidal Range, Measure DD

Poster Topic: Public Education & Outreach

San Francisco Historical Ecology Transect Exhibit

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To engage the general public with the ecology and history of the Bay Area, The Exploratorium science museum undertook a study to create an exhibit highlighting landscape change over time on the San Francisco Peninsula.

The Exploratorium collaborated with scientists from San Francisco Estuary Institute and a UC Berkeley PhD student/artist-in-residence to research and illustrate contemporary and historical conditions along a transect stretching from the Bay Bridge to the Golden Gate Bridge. The illustrated transect explores the transformation of San Francisco's northeastern corner from initial European settlement (c. 1850) to today, revealing changes in surface conditions, underground infrastructure, habitat patterns and shoreline gradients. The team referenced a wide range of historical and contemporary sources including initial accounts of European explorers, the earliest U.S. Coast Survey maps, geologic and soil borings over time, city infrastructure documentation, ecologic research studies, the latest NOAA bathymetry surveys, image libraries and expert opinion.

This representation of a slice of the city through time invites the public to investigate land use change by juxtaposing historic and present-day views and relating well-known landmarks such as the bridge towers, the Embarcadero seawall, Coit Tower, or Fort Mason piers to past land forms, vegetation, and wildlife. The scale of human impact on the landscape is emphasized and compared with the time scales of geologic formations. A curated collection of illustrations, diagrams, photographs and first-hand accounts help contrast the dynamics of these two vastly different landscapes from the perspectives of ecologic function (such as sand dune formation and habitat), physical processes (such as bridge scour) and human use (such as shipping and commerce). To correlate direct observation of the local landscape with the interpreted data, the transect is presented as a large-scale mural in the Exploratorium's Bay Observatory, in close proximity to the study area.

Keywords: Historical, Ecology, Shoreline, Change, Land Use, Museum, Education, Art, Urbanization

Poster Topic: Public Education & Outreach

Design and Implementation of a Hands-On Water Engineering Challenge for a Public Science Center: An Interdisciplinary Collaboration of Scientists, Engineers, and Museum Staff

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An interdisciplinary team of graduate students and a postdoctoral scholar from the University of California, Berkeley and Stanford University collaborated with museum educators from the Ingenuity Lab at the Lawrence Hall of Science in Berkeley, CA to create a hands-on, engineering design challenge. The challenge investigated managing stormwater in cities with watersheds like that of the San Francisco Bay. The exhibit was showcased for nine days in February 2013, and more than 1000 visitors participated in the challenge. Participants designed and built a portion of a city landscape using simple materials and tested their city's ability to retain stormwater, prevent flooding, and capture pollutants, while considering ecological impacts on the bay. Visitors iteratively improved their designs to better use green infrastructure to protect the bay, often designing multiple city landscapes. Ingenuity Lab staff considered the challenge a success because it appealed to both female and male children, and visitors stayed an average of 32±14 minutes, a relatively long time compared to typical museum exhibits. Moreover, survey responses demonstrated visitors' understanding of the issues and terminology of infiltration and runoff, as well as the importance of green infrastructure in urban design. This collaboration allowed the design team to distill their work down to basic concepts and provided Ingenuity Lab visitors with a relevant, real-world engineering problem. In this way, the public was exposed to local stormwater management and its impact on aquatic ecosystems, influencing them to further pursue the issue.

Keywords: Public Education, Stormwater, Green Infrastructure, Museum

Poster Topic: Public Education & Outreach

Change Our Disposable Plastic Waterways

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Human litter, plastics and other marine debris are some of the greatest threats to marine life today. Since 2009, Wood Middle School 6th grade SLWRP (service-learning waste reduction project) classes have worked at study sites at Crown Memorial Beach to collect and analyze marine debris with a focus on nurdles. Over 5,000 nurdles have been sent to Dr. Hides Takada for analysis through the International Pellet Watch Program. Students work 1 x 1 meter plots, collecting nurdles, polystyrene, cigarette filters, and other harmful debris that affects ocean food webs. Wood School is a third year recipient of a NOAA Ocean Guardian Grant to facilitate this work. Our Mission Statement is: practice environmental awareness to use less, recycle more, and to protect the San Francisco Bay ecosystems from pollution. Our service-learning work is a collaboration among StopWaste.org, ACOE SLWRP, and East Bay Regional Park District. In 2009-10, students worked with park staff through the process from design to installation of a colorful educational sign about plastic pollution at Shoreline Drive and Grand Street on Crown Beach. Our nurdles data can be viewed at www.pelletwatch.org. In May 2011, Wood SLWRP Program received a Congressional Award from Congressman Sam Farr for its outstanding work in environmental education supporting ocean health. When students lead by teaching others about ocean literacy, powerful learning, civic responsibility, and community pride abounds. Service-learning collaborations such as those above are rewarding for students and community while contributing to the physical, chemical, and biological integrity of the San Francisco Bay estuary and its ecosystems. Transportation costs are the most prohibitive barrier to student service work. Agencies should seek grants or awards to assist schools in accessing service opportunities within the estuarine system.

Keywords: Marine Debris, Nurdles, Hydrophobic, Polystyrene

Poster Topic: Public Education & Outreach

California Estuary Monitoring Workgroup: Using Web Portals to Improve Scientific Understanding

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After the initial portal launch in fall 2013, the California Estuary Monitoring Workgroup (CEMW) will continue efforts to develop the public portal, improve web-based collaboration tools, enhance access to environmental monitoring data, and identify performance measures (ecosystem health indicators with target goals). Learn why you should, and how you can, be part of this collaborative effort, involving multiple government agencies and non-governmental organizations, working toward improved estuarine science, restoration, and protection of beneficial uses.

Keywords: Estuary, Web Portal, Tool, CEMW, Public, Science Communication, Collaborative, Data

Poster Topic: Public Education & Outreach

California Environmental Data Exchange Network: Standardizing Data for Statewide Integration and Assessment

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Several recent efforts in California to understand critical environmental issues such as the decline of pelagic fish in Sacramento-San Joaquin Delta have met with little success. A large part of the failure is due to the lack of access to water quality data or the poor quality of available data. Partly as a response, the state of California developed the California Environmental Data Exchange Network (CEDEN), a data storage and management system designed to facilitate integration and sharing of data collected throughout the state (www.ceden.org). CEDEN's mission is to simplify and improve access to California's water quality monitoring data by integrating, standardizing and displaying data from the State's many diverse monitoring and data management programs.

To share data, CEDEN uses its own query tools, as well as online portals such as the Federal water quality exchange (WQX, http://www.epa.gov/storet/) and the California Water Quality Monitoring Council's My Water Quality portals (http://www.waterboards.ca.gov/mywaterquality/). CEDEN uses a Regional Data Center approach, where a local contact for a designated region of California is available to assist data providers. There are currently four Regional Data Centers (RDCs) across California that provide tools and guidance for submitting data. There are minimum data requirements for submitting data and data templates are available for most data types.

Data from the following programs (plus many more) are currently available through the CEDEN online query tool: Surface Water Ambient Monitoring Program, Irrigated Lands Regulatory Program, San Francisco Bay Regional Monitoring Program, Fish Mercury Project, EPA EMAP, CCAMP, TMDL projects, and Southern California Bight monitoring program. The State Board is working with DWR, USGS, and USBR to integrate their data sets to CEDEN online tools.

CEDEN is moving forward with its efforts to store and share data which are available to address critical issues and aid in the development of California water policy.

Keywords: Data Management, Water Quality, Portal Public, Access

Poster Topic: Public Education & Outreach